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PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of

Docket No: A8564

Zeev ALTBOUM, et al.

Appln. No.: 09/839,894

Group Art Unit: 1648

Confirmation No.: 4293

Examiner: Lucas, Z.

Filed: April 20, 2001

For: ISOLATION AND CHARACTERIZATION OF THE CSA OPERON (ETEC-CS4 PILI)
AND METHODS OF USING SAME

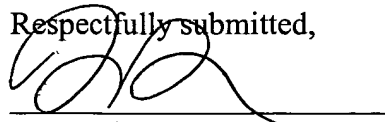
SUPPLEMENT TO AMENDMENT UNDER 37 C.F.R. § 1.111

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Enclosed herewith are the curriculum vitae of Dr. Myron Levine and Dr. Eileen Barry,
both of which executed the Declaration Under 37 C.F.R. §1.132 submitted with the Amendment
Under 37 C.F.R. §1.111 on April 20, 2004. Applicants neglected to include the curriculum vitae
with the Amendment Under 37 C.F.R. §1.111 filed on April 20, 2004.

Respectfully submitted,


Drew Hissong
Registration No. 44,765

SUGHRUE MION, PLLC
Telephone: (202) 293-7060
Facsimile: (202) 293-7860

WASHINGTON OFFICE

23373

CUSTOMER NUMBER

Date: April 21, 2004



CURRICULUM VITAE

Eileen M. Barry, Ph.D.
Assistant Professor of Medicine

March 23, 2004

Personal Information

Center for Vaccine Development
University of Maryland School of Medicine
685 West Baltimore Street
HSF 480
Baltimore, Maryland 21201

Phone: 410-706-3702
Fax: 410-706-6205
E-mail: ebarry@medicine.umaryland.edu

Education

1985	B.A. (Biology) University of Delaware, Newark, De. (French minor)
1991	Ph.D. (Microbiology and Immunology) Medical College of Virginia, Virginia Commonwealth University, Richmond, Va. Advisor: Alison A. Weiss, Ph.D.

Post Graduate Training

1992-1994	Postdoctoral Fellow, Center for Vaccine Development, University of Maryland School of Medicine, Baltimore, Md. Advisor: J. Glenn Morris, Jr., M.D.
1994-1996	Postdoctoral Fellow, Center for Vaccine Development University of Maryland School of Medicine, Baltimore, Md. Advisor: Myron M. Levine, M.D., D.T.P.H.

Employment History

Industry

1985-1986	Toxicology Research Technician, Mobil Oil Corp., Pennington, N.J
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Academic

1996-Present	Assistant Professor of Medicine, Center for Vaccine Development, University of Maryland, Baltimore.
1998-Present	Chief, <i>Shigella</i> /ETEC Vaccine Section Center for Vaccine Development

Professional Memberships

American Society for Microbiology, 1987-present
American Association for the Advancement of Science, 1997-present
American Chemical Society, 2001

Administrative Service

Institutional Service

2002 Center for Vaccine Development Frontiers in Vaccinology Speaker
 Search Committee
2003 BSL4/NBL Facility Proposal Committee (A. Azad, PI)
2003-present HSFII/BSL3 Oversight Committee
2003 Center for Vaccine Development Plasmid Manufacture RFP
 Evaluation Committee

Mentoring Committees:

Doctoral thesis committee, Cara Fiore, 1998-2001
Doctoral thesis committee, Thames Pickett, 1999
Doctoral thesis committee, Laurel Courtemanch Burall, 2001 - present
Doctoral thesis committee, Laura Quinn, 2001 – present
Doctoral thesis committee, Jennifer Smart, 2003 - present

International and National Service

Study Section Member

1999-2004 Military Infectious Disease Research Program, American Institute of
 Biological Sciences
2000 NIH, NIAID Special Emphasis Panel: Innovative Research in Human
 Mucosal Immunity
2004 NIAID Special Emphasis Panel: Biodefense and Emerging Infectious
 Disease Research Opportunities

Temporary Adviser, World Health Organization: Future Directions of Research
on ETEC Vaccines for Children in Developing Countries, September 8-9, 2003

Panel Member: Joint Medical Technology Workshop, Military Infectious Disease:
Diarrhea and other Bacterial Diseases. December, 2003.

Editorial Tasks

Ad Hoc Reviewer:

Microbial Pathogenesis
Infection and Immunity
Journal of Immunology
Journal of Bacteriology
Nature Biotechnology
Clinical and Experimental Immunology
Expert Opinion on Biological Therapy

Local Service

Community Science Activities

Judge, Baltimore County Science Fair, Baltimore Chapter ASM, 1997

Teacher, SMART Program, (Science Math and Related Technologies) Howard County, Maryland 1997

Judge, Graduate Student Day, University Of Maryland Baltimore, and Baltimore County Campuses 1998

Girl Scouts of Maryland Science Day, 2002

Teaching Service

Medical Microbiology I, Medical College of Virginia, one lecture per year, 1990, 1991 (10 graduate students; 1.0 hrs./yr.)

Molecular Pathogenesis, University of Maryland, Baltimore, one lecture per year, 1994, "*Yersinia*" (8 graduate students, 1.5 hrs.)

PREV 789 Vaccinology

1998, "NonTarget Effects" (10 graduate students and fellows/yr, 1.0 hrs./yr)

2001, 2003 "DNA Vaccines" (10 graduate students and fellows/yr, 1.0 hrs./yr)

2003 Co- Course Master

MMIC 701 Principles of Bacterial Pathogenesis

2001-2004 "Evasion of Host Immune Responses"

(7 graduate students/yr, 1.5 hrs./yr)

2003, "*Bordetella*" (7 graduate students/yr, 1.5 hrs./yr)

MSPR 520 Host Defenses and Infectious Diseases I, II, III, 6 labs/year

2001-2003 (40 medical students/yr; 12 hrs./yr.)

MSPR 520 Host Defenses and Infectious Diseases Small Group

2002-2003 Molecular Koch's Postulates

(20 medical students/yr; 1.0 hrs./yr.)

MEDT 490 Pathogenic Microbiology, Division of Medical Research Technology

2002-2004 "Enterics I" (18 DMRT students/yr; 1.5 hrs./yr)

2002-2004 "Enterics II" (18 DMRT students/yr; 1.5 hrs./yr)

2002-2004 "*Haemophilus* and Fastidious Bacteria"

(18 DMRT students/yr; 1.5 hrs./yr)

MEDT 454 Applied Cellular and Molecular Biology

2002, 2003 "Special Topics: STM, RIVET, IVET" (8 DMRT students; 1.5 hrs/yr)

BSCI-424 Pathogenic Microbiology (College Park)

2003, "*Streptococci*" (140 undergraduate students; 1.0 hrs/yr)

Laboratory Trainees

Morteza Loghmani, Medical Technology Student, 1997

Richard Anderson, Ph.D. Post Doctoral Fellow, 1998

Zeev Altboum, Ph.D. Visiting Fellow, 1998-2000

Hilary Koprowski II, M.S. Research Associate, 1998-1999

Fernando Ruiz, Visiting Graduate Student, 1998-1999

Daniela Jodorkovsky, Summer Student, 1999

Tom Nijenhuis, M.D. Visiting Fellow, 1999-2000

Navara Malayaman, M.S. Research Assistant, 1999-2000

Romina Magno, M.S. Research Assistant, 2000

Peter Thomas, M.S. Research Assistant, 2000-2001

Araceli Santiago, Ph.D. Postdoctoral fellow, 2001-present
Christofer Vindurampulle, Ph.D. Research Fellow, 2002-present
ManKi Song, Ph.D., Research Fellow, 2002-present
Anthony Herrera, Medical Technology Student, 2003-present

Publications

Refereed Journals

1. Barry, E.M., A.A. Weiss, I.E. Ehrmann, M.C. Gray, E.L. Hewlett, and T.S. Goodwin. 1991. *Bordetella pertussis* Adenylate Cyclase Toxin and Hemolytic Activities Require a Second Gene, *cyaC*, for Activation. J. Bacteriol. 173:720-726.
2. Ehrmann, I.E., A.A. Weiss, T.S. Goodwin, M.C. Gray, E.M. Barry, and E.L. Hewlett. 1992. Enzymatic Activity of Adenylate Cyclase Toxin from *Bordetella pertussis* is not Required for Hemolysis. FEBS 304:51-56.
3. Hewlett, E.L., M.C. Gray, I.E. Ehrmann, N.J. Maloney, A.S. Otero, L. Gray, M. Allietta, G. Szabo, A.A. Weiss, and E.M. Barry. 1993. Characterization of Adenylate Cyclase Toxin from a Mutant of *Bordetella pertussis* Deficient in the Activator Gene *cyaC*. J. Biological Chem. 268:7842-7848.
4. Levine, M.M., C. Tacket, J. Galen, E. Barry, F. Noriega, S. Chatfield, M. Sztein, and G. Dougan. 1995. Progress in Vaccines Against Typhoid Fever. Southeast Asian Journal of Tropical Medicine and Public Health. 26:264-271.
5. Levine, M.M., J. Galen, E.M. Barry, F. Noriega, S. Chatfield, M. Sztein, G. Dougan, and C. Tacket. 1996. Attenuated *Salmonella* as Live Oral Vaccines against Typhoid Fever and as Live Vectors. Journal of Biotechnology 44:193-196.
6. Sulkvelidze, A., K. Dalakishvili, E.M. Barry, R. Robins-Browne, and J.G. Morris. 1996. Analysis of Clinical and Environmental *Yersinia* Isolates in the Republic of Georgia. Journal of Clinical Microbiology 34:2325-2327.
7. Barry, E.M., O. Gomez-Duarte, S. Chatfield, R. Rappuoli, J. Galen, G. Losonsky and M.M. Levine. 1996. Expression and Antigenicity of Pertussis Toxin S1 Subunit-Tetanus Toxin Fragment C Fusions in the *S. typhi* Vaccine Strain CVD 908. Infect. and Immun. 64:4172-4181.
8. Franco, A.A., J.A. Johnson, E.M. Barry, P. Yeh, R. Maurer, and J.G. Morris. 1996. Cloning and Characterization of *dnaE*, Encoding the Catalytic Subunit of Replicative DNA Polymerase III, from *Vibrio cholerae* Strain C6706. Gene 175:281-281.
9. Kotloff, K. L., F. Noriega, T. Samandari, M. Sztein, G. Losonsky, J. Nataro, W. Picking, E. M. Barry, and M. M. Levine. 2000. *Shigella flexneri* 2a strain CVD 1207 with Specific Deletions in *virG*, *sen*, *set*, and *guaBA* is Highly Attenuated in Humans. Infect. and Immun. 68:1034-1039.
10. Koprowski II, H., M. M. Levine, R. Anderson, G. Losonsky, M. Pizza, and E. M.

Barry. 2000. Attenuated *Shigella flexneri* 2a Vaccine Strain CVD 1204 Expressing Colonization factor Antigen I (CFA/I) and Mutant Human Heat Labile Toxin of Enterotoxigenic *Escherichia coli*. Infect. and Immun. 68:4884-4892.

11. Wang, J. Y., F. Noriega, J. Galen, E. M. Barry, and M. M. Levine. 2000. Constitutive Expression of the Vi Polysaccharide Capsular Antigen in Attenuated *Salmonella enterica* Serovar Typhi Oral Vaccine Strain CVD 909. Infect. and Immun. 68:4647-4652.

12. Altboum, Z., E.M. Barry, G. Losonsky, and M.M. Levine. 2001. Attenuated *Shigella flexneri* 2a Δ guaBA strain CVD 1204-expressing ETEC CS2 and CS3 fimbriae as a live mucosal vaccine against *Shigella* and enterotoxigenic *Escherichia coli* infection. Infect. And Immun. 69:3150-3158.

13. Ruiz-Perez, F., R. Leon-Kempis, A. Santiago-Machuca, G. Ortega-Pierres, E. M. Barry, M.M. Levine, and G. Gonzalez-Bonilla. 2002. Expression of the *Plasmodium falciparum* Immunodominant Epitope (NANP)₄ on the Surface of *Salmonella enterica* using the Autotransporter MisL. Infect and Immun. 70:3611-3620.

14. Barry, E.M., Z. Altboum, G. Losonsky, and M.M. Levine. 2003. Immune Responses Elicited Against Multiple Enterotoxigenic *Escherichia coli* Fimbriae and Mutant LT expressed in Attenuated *Shigella* Vaccine Strains. Vaccine. 21:333-340

15. Altboum, Z, Myron M. Levine, James E. Galen, and Eileen M. Barry. 2003. Characterization and Immunogenicity of Coli Surface Antigen 4 (CS4) from Enterotoxigenic *E. coli* when it is Expressed in *Shigella flexneri* Live Vector Strain. Submitted Infect. Immun. Infect. and Immun. 71:1352-1360.

16. Pasetti, M. F., E. M. Barry, G. Losonsky, M. Singh, S. M. Medina-Moreno, J. M. Polo, J. Ulmer, H. Robinson, M. B. Sztein, and M.M. Levine. 2003. Attenuated *Salmonella enterica* serovar Typhi and *Shigella flexneri* 2a Strains Mucosally Deliver DNA Vaccines Encoding Measles Virus Hemagglutinin, Inducing Specific immune responses and Protection in Cotton Rats. J. Virol. 77: 5209-5217

17. Vindurampulle, C.J., L. Cuberos, E.M. Barry, M.F. Pasetti, and M.M. Levine. 2004. Recombinant *Salmonella enterica* serovar Typhi in a prime-boost strategy. Vaccine, in press.

Non-refereed Journals

1. Barry, E.M., A.A. Weiss, M.C. Gray, E.L. Hewlett, I.E. Ehrmann, and M.S. Goodwin. 1990. Mutational Analysis of the Adenylate Cyclase Toxin of *Bordetella pertussis*. p. 260-265. In C.R. Manclark (ed.). Proceedings of the Sixth International Symposium on Pertussis. Department of Health and Human Services, United States Public Health Service, Bethesda, Maryland. DHHS Publication No. (FDA) 90-1164.

2. Hewlett, E.L., I.E. Ehrmann, N.J. Maloney, P.R. Fregman, E.M. Barry, A.A. Weiss, and M.C. Gray. 1991. Adenylate Cyclase Toxin from *Bordetella pertussis*: Characterization of Toxin-Catalyzed Intoxication and Hemolysis. In B. Witholt et al. (eds). Bacterial Protein Toxins, Zbl. Bakt. Suppl. 23, Gustav Fischer, Stuttgart, Jen,

New York, 1992, pp 241-248.

Book Chapters:

1. Levine, M.M., C.O. Tackett, J.E. Galen, E.M. Barry, S.N. Chatfield, G. Dougan, F. Noriega, and M.B. Sztein. 1997. Progress in Development of New Attenuated Strains of *Salmonella typhi* as Live Oral vaccines. In: New Generation Vaccines, Second Edition. M.M. Levine, G.C. Woodrow, J.B. Kaper, and G.S. Cobon Eds., Marcel Dekker Inc., New York, N.Y. pp. 437-446.
2. Levine, M.M., and E.M. Barry. 1997. Inadvertant Nontarget Effects of Live Vaccines. In: New Generation Vaccines, Second Edition. M.M. Levine, G.C. Woodrow, J.B. Kaper, and G.S. Cobon Eds., Marcel Dekker Inc., New York, N.Y. pp. 1179-1183.

Book chapters, continued

3. Levine, M. M., E.M. Barry, J.P. Nataro, and J.B. Kaper. 1998. The Molecular Epidemiology of 19th Century Cholera. In: Digging for Pathogens. Balaban Publishers, Rehovot, Israel. pp. 265-276.
4. Levine, M.M., J. Galen, E.M. Barry, C. Tacket, K. Kotloff, O. Gomez, M. Pasetti, T. Pickett, and M. Sztein. 2000. Live Vectors: Have They Delivered? In: "Fighting Infection". Blackwell Science, London, pp. 72-86.
5. Levine, M.M., J.E. Galen, E.M. Barry, M.F. Pasetti, C.O. Tacket, and M.B. Sztein. 2002. Attenuated *Salmonella* and *Shigella* Live Vectors. In: Vaccine Delivery Strategies. G. Dietrich and W. Goebel Eds. Horizon Scientific Press, Norfolk, U.K, pp. 185-210.
6. Nataro, J.P. and E.M. Barry. Diarrheal Disease Vaccines. 2004. In: "Vaccines 4th Edition". S.A. Plotkin and W. Orenstein Eds. Elsevier Science. Philadelphia, PA. pp. 1209-1217.
7. Barry, E.M. and M.M. Levine. Multivalent *Shigella*-Enterotoxigenic *Escherichia coli* Vaccine. In: New Generation Vaccines, Third Edition. M.M. Levine, J.B. Kaper, R. Rappuoli, M.A. Liu, and M.F. Good Eds., Marcel Dekker Inc., New York, N.Y. In press.
8. Levine, M.M., J.E. Galen, C.O. Tacjet, E.M. Barry, M. Pasetti, and M. Sztein. Attenuated Strains of *Salmonella enterica* serovar Typhi as Live, Oral Vaccines Against Typhoid fever. In: New Generation Vaccines, Third Edition. M.M. Levine, J.B. Kaper, R. Rappuoli, M.A. Liu, and M.F. Good Eds., Marcel Dekker Inc., New York, N.Y. In press.
9. Galen, J.E., M.F. Pasetti, M.B. Sztein, E.M. Barry, and M.M. Levine. Attenuated *Salmonella* and *Shigella* as Live Vectors Carrying either Prokaryotic or Eukaryotic Expression Systems. In: New Generation Vaccines, Third Edition. M.M. Levine, J.B. Kaper, R. Rappuoli, M.A. Liu, and M.F. Good Eds., Marcel Dekker Inc., New York, N.Y. In press.

Abstracts:

1. Barry, E.M., and A.A. Weiss. 1989. Genetic Analysis of the Adenylate Cyclase Toxin/Hemolysin Operon of *Bordetella pertussis*. American Society for Microbiology, Annual Meeting, New Orleans, LA.
2. Barry, E.M., A.A. Weiss, M.S. Goodwin, E.L. Hewlett, M.C. Gray, and I.E. Ehrmann. 1990. Mutational Analysis of the Adenylate Cyclase Toxin/Hemolysin of *Bordetella pertussis*. Gordon Research Conference, Microbial Toxins and Pathogenesis.
3. Barry, E.M., and A.A. Weiss. 1992. Regulation and Expression of the *Bordetella pertussis* Adenylate Cyclase Toxin Genes. American Society for Microbiology, Annual Meeting, New Orleans, LA.
4. Hewlett, E.L., M.C. Gray, A. Otero, I.E. Ehrmann, N.J. Maloney, G. Szabo, A.A. Weiss, and E.M. Barry. 1992. Characterization of Adenylate Cyclase Toxin from BPDE386, a Mutant Defective in *cyaC*. American Society for Microbiology, Annual Meeting, New Orleans, LA.
5. Hewlett, E.L., M. Gray, A.A. Weiss, and E.M. Barry. 1993. Adenylate Cyclase Toxin Produces an Ion-Permeable Pore in a Phospholipid Bilayer. American Society for Microbiology, Annual Meeting, Atlanta, GA.
6. Barry, E.M., A. Quek, R.M. Robins-Browne, and J.G. Morris, Jr. 1993. Analysis of *Yersinia enterocolitica ypkA* Expression Using a Luciferase Reporter System. 17th Annual Mid-Atlantic Extrachromosomal Elements and Molecular Genetics Meeting. Virginia Beach, VA.
7. Sulakvelidze, A., E.M. Barry, K. Dalakishvili, and J.G. Morris, Jr. 1994. Distribution of *Yersinia enterocolitica* Isolates in the Republic of Georgia; Uncommon Serotypes and Study of Markers. American Society for Microbiology, Annual Meeting, Las Vegas, NE.
8. Barry, E.M., J. Galen, S. Chatfield, R. Rappuoli, and M.M. Levine. 1995. Stable Expression of *B. pertussis* Antigens in the *S. typhi* Live Oral Vaccine Strain CVD 908. Keystone Symposia on Mucosal Immunity: New Strategies for Protection Against Viral and Bacterial Pathogens, Keystone, CO.
9. Franco, A., E.M. Barry, and J.G. Morris, Jr. 1995. Cloning and Sequence Analysis of *Vibrio cholerae dnaE*. American Society for Microbiology, Annual Meeting, Washington, D.C.
10. Barry, E.M., O. Gomez, S. Chatfield, R. Rappuoli, J. Galen, and M.M. Levine. 1995. Stable Expression of Pertussis Toxin S1 Subunit - Fragment C Fusions in the *S. typhi* Vaccine Strain CVD 908. American Society for Microbiology, Annual Meeting, Washington, D.C.
11. Barry, E.M., C. Guzman, J. Galen, K. Timmis, and M.M. Levine. 1996. Expression of *B. pertussis* Antigens in the *S. typhi* Vaccine Strain CVD 908. American Society for Microbiology, Annual Meeting, New Orleans, LA.

12. Barry, E.M., M. Pizza, R. Rappuoli, and M.M. Levine. 1997. Co-Expression of LTK63 and DTP Antigens in *S. typhi* Vaccine Strain CVD 908htrA. American Society for Microbiology, Annual Meeting, Miami Beach, FL.
13. Xiang, Z., E. Barry, C. Guzman, K. Timmis, and M.M. Levine. 1997. Immunization of Mice with Multiple DTP Antigens Delivered in *S. typhi* Vaccine Strain CVD 908htrA. American Society for Microbiology, Annual Meeting, Miami Beach, FL.
14. Barry, E.M., and M.M. Levine. 1998. Immune Responses to the *Bordetella pertussis* Antigens Pertactin and Pertussis Toxin Expressed in *S. typhi* Vaccine Strains. American Society for Microbiology, Annual Meeting, Atlanta, GA.
15. Barry, E.M., F. Ruiz, J.S. Sampson, E.W. Ades, G.M. Carlone, and M.M. Levine. 1999. Expression of PsaA from *S. pneumoniae* in *S. typhi* Vaccine Strain CVD 908htrA. American Society for Microbiology, Annual Meeting, Chicago, IL.
16. Z. Altboum, J. Galen, E.M. Barry, and M.M. Levine. 1999. Construction of a Bivalent *Shigella*-ETEC Vaccine Expressing CS2 and CS3 Pili. American Society for Microbiology, Annual Meeting, Chicago, IL.
17. H. Koprowski II, R.J. Anderson, J. Galen, E.M. Barry, and M.M. Levine. 1999. Construction and Analysis of a *Shigella flexneri* 2a/CFA/I Vaccine. American Society for Microbiology, Annual Meeting, Chicago, IL.
18. E.M. Barry, F. Ruiz, J.C. Paton, E.W. Aides, J. Sampson, G. Carlone, and M.M. Levine. 2000. Immunogenicity of the Pneumococcal Antigens PsaA and Pneumolysin Expressed in *S. typhi* Vaccine Strain CVD 908htrA. American Society for Microbiology, Annual Meeting, Los Angeles, CA.
19. Altboum, Z., E.M. Barry, J.E. Galen, and M.M. Levine. 2000. Construction of a Bivalent *Shigella*-ETEC Vaccine Expressing CS4 Pili. American Society for Microbiology, Annual Meeting, Los Angeles, CA.
20. E.M. Barry, Z. Altboum, and M.M. Levine. 2001. Construction of a Multivalent *Shigella*/ETEC Hybrid Vaccine. American Society for Microbiology, Annual Meeting, Orlando, FL.
21. E.M. Barry, A.E. Santiago, J. Sampson, E. Aides, G. Carlone, J. Paton, D. Briles, and M.M. Levine. 2002. Multiple Pneumococcal Antigens Expressed in Attenuated *S. typhi* Vaccine Strains. 3rd International Symposium on Pneumococci and Pneumococcal Diseases. Anchorage, Alaska.
22. Santiago, A.E., M.M. Levine, and E.M. Barry. 2002. Expression of the *S. pneumoniae* antigens PsaA, Ply, and PspA in *Salmonella enterica* Serovar Typhi Vaccine Strain CVD 908htrA. American Society for Microbiology, Annual Meeting, Salt Lake City, Utah.
23. Santiago, A.E., M.M. Levine, and E.M. Barry. 2003. Expression of the *S. pneumoniae* PspA Antigen in *Salmonella enterica* serovar Typhi Vaccine Strain CVD 908htrA and Evaluation in a Mouse Model. American Society for Microbiology, Annual

Meeting, Washington, D.C.

Major Invited Speeches

1. New Frontiers in the Development of Vaccines Against Enterotoxigenic and Enterohemorrhagic *E. coli* Infections: "Live Oral Strategies". December 4-5 1998, Research Institute, International Medical Center of Japan. World Health Organization, sponsor. Tokyo, Japan.
2. Society for Industrial Microbiology Annual Meeting: Recombinant Vaccine Delivery Session, July 7, 2000. "The Use of Attenuated *Salmonella* and *Shigella* Vaccine Strains to Deliver Heterologous Antigens". San Diego, California.
3. Merck Research Laboratories Guest lecturer, February 13, 2001: "Live Attenuated *Salmonella* and *Shigella* as Delivery Vehicles for Heterologous Antigens". Rahway, New Jersey.
4. American Chemical Society National Meeting, Advances in Vaccine Development Session, April 2, 2001: "The Use of Attenuated *Shigella* Vaccine Strains to deliver Heterologous Antigens and DNA Vaccines". San Diego, California.
5. Second International Conference on Vaccines for Enteric Diseases, Invited Speaker, September 12, 2001. "Co-Expression of ETEC Fimbriae and Mutant LT in Attenuated *Shigella*". Tampere, Finland.
6. Future Directions of research on ETEC for Children in Developing Countries, September 9, 2003: "Multivalent *Shigella*/ETEC Vaccine". World Health Organization, sponsor. Montreux, Switzerland.

Proffered Communications

Center for Vaccine Development, University of Maryland, Baltimore, Faculty Seminar, October 24, 2001. "Multivalent ETEC Antigen Expression in Attenuated *Shigella* Vaccine Strains". Baltimore, Maryland.

11/3/03

CURRICULUM VITAE

Name	Myron Max Levine, M.D., D.T.P.H., F.A.A.P., F.A.C.P.M.
Date of Birth	February 11, 1944
Place of Birth	Riverdale, New York
Citizenship	U.S.A.
Social Status	Married (Suzanne), three children (Orin, Rachel, Rebecca)
Preliminary Education	Evander Childs High School, Bronx, New York 1959
Degrees	B.S. City College of New York 1963 M.D. Medical College of Virginia 1967 D.T.P.H. (with Distinction) London School of Hygiene and Tropical Medicine 1974
Student Fellowships	Louisiana State University - N.I.H. Fellow in Tropical Medicine, June-September 1966 I.C.M.R.T., San Jose, Costa Rica Supervisor: Antonio Pena-Chavarria, M.D. H.E.W. Fellow in Pediatric Clinical Research, Jinnah Children's Hospital, Karachi, West Pakistan March - June, 1967 Supervisor: Kathryn Bain, M.D.
Internship & Residency Training	Bronx Municipal Hospital Center, Albert Einstein College of Medicine, Bronx, New York Internship (Pediatric)-July 1967-June 1968 Assistant Pediatric Resident-July 1968-June 1969 Senior Pediatric Resident-July 1969-June 1970 Supervisors: Henry Barnett, M.D., Lewis Fraad, M.D.
Post-Doctoral Fellowship Training	Fellow in Pediatric Infectious Diseases, Division of Pediatric Infectious Diseases and Immunology, Department of Pediatrics, Albert Einstein College of Medicine, January - June 1970 Supervisor: John B. Robbins, M.D. Fellow, Division of Infectious Diseases, University of Maryland School of Medicine, August 1970 - July 1972 Supervisors: Richard B. Hornick, M.D.; Herbert L. DuPont.
Professional Societies	Fellow of the American Academy of Pediatrics Fellow of the American College of Preventive Medicine Fellow of the Infectious Diseases Society of America (elected 1976) American Society of Tropical Medicine & Hygiene

American Epidemiological Society (elected 1982)
Elected President 2000-2001

Royal Society of Tropical Medicine & Hygiene

American Society for Microbiology

Society for Epidemiologic Research

Society for Intestinal Microbial Ecology and Disease

Baltimore City Medical Society-Subcommittee on
International Health, 1976; Chairman, Public Health
Committee, 1977-1981

Medical and Chirurgical Faculty of Maryland-Chairman,
Subcommittee on Infectious Diseases, 1977-1978.
American Society for Clinical Investigation (elected 1986)

Sociedad Latinoamericana de Infectologia Pediatrica (corresponding member
inducted October, 1991)

Association for American Physicians (elected 1993)

American Academy of Microbiology (1995)

Member, Institute of Medicine,
National Academy of Sciences, elected October, 1995

Professional Boards

Pediatric Boards, Part I (Written) 1970

Pediatric Boards, Part II (Oral) 1972

Preventive Medicine Boards 1975

Exchangeships

Student AMA exchange student to the Hebrew University
Medical School, Jerusalem, Israel, June-September, 1964

Exchange student to Department of Dermatology,
L'Hôpital Saint-Louis, Paris, France,
June - September, 1965 - Sponsored by the Parisian
Society of Medical Students.

Fraternities and Honor Societies

Alpha Omega Alpha Medical Honor Society

Sigma Zeta Science Honor Society

Phi Delta Epsilon Medical Fraternity,
President Alpha Mu Chapter, 1965-66
Secretary 1964-1965

Scholarships

Aaron Brown Memorial Scholarship Award 1966

Sabbatical Activity	Fellow of the Sackler Institute of Advanced Studies, Tel Aviv University, Israel, September, 1987 to February, 1988.
Medical Licensure	National Boards New York State License Virginia Boards Virginia License Maryland License (current)
International Committees	Steering Committee on Diarrhoeal Disease Vaccines, Programme for Vaccine Development, World Health Organization, 1992-1994. Steering Committee on Diarrhoeal Disease Vaccines, Global Programme for Vaccines, World Health Organization, 1995. Member, Task Force on Vaccines, International Association of Biological Standardization, 1995- Member International Advisory Committee, Oxford Vaccine Group, 1995 Ad Hoc member, WHO Steering Committee Meeting on Vaccines against <i>Leishmania</i> , March, 1997 Member, Steering Committee on New Vaccination Approaches, Global Programme for Vaccines and Immunization, World Health Organization, 1997 Chairman, Working Group on Mucosal Vaccines, Steering Committee on New Vaccination Approaches, Global Programme for Vaccines and Immunization, World Health Organization, December, 1997-1999 Member, World Bank/World Health Organization/UNICEF/Industry/Rockefeller Foundation Working Group on Vaccine Development and Immunization, July 1998-March, 1999 Member, Working Group of the Global Coalition for Vaccines and Immunization April 1999- July 15, 1999 Member, Working Group of the Global Alliance for Vaccines and Immunization (GAVI), July 16, 1999 – June 20, 2002 Co-Chair, Task Force on Research and Development, GAVI, June 2000-present Member, WHO Product Development Group for Aerosol Measles Vaccine, August 2002- Member, International Advisory Board, Centre for Clinical Vaccinology and Tropical Medicine, University of Oxford, 2003 – Cholera and Other Bacterial Enteric Infections Panel of the U.S.-Japan Cooperative Medical Science Program, 2003-2007.
National Committees, etc.	Recombinant DNA Advisory Committee, National Institutes of Health

July 1980-September 1984

Member Organizing Committee, NIH National Consensus
Conference on Travelers' Diarrhea - May 1984

National Research Council,
National Academy of Sciences
Steering Committee for the Study of the U.S.
Capacity to Address Tropical Disease Problems
August, 1984

Member, Technical Advisory Group for the AID-sponsored
Applied Diarrheal Diseases Research Project of the
Harvard Institute for International Development,
1986 - 1988

Member, Technical Advisory Group for the
U.S.-Aid-sponsored DiaTech Project, 1986 - 1990

Nominating Committee, American Epidemiological Society, 1991

Data and Safety Monitoring Board, AIDS/HIV trials Conducted by the U.S.
Department of Defense, 1991-1993

National Vaccine Advisory Committee, 1995-1999
Chair, Future Vaccines Sub-committee, 1997-1999

Member, Blue Ribbon Panel that evaluated the NIAID research plan for malaria
vaccine development, June, 1997

NIAID Strategic Plan Task Force, 1999

Data and Safety Monitoring Board, Cytomegalovirus (HCMV) protocol evaluated
by DMID, 2000-present

Department of Defense Blue Ribbon Panel on Analysis of Alternatives for
Biological Defense Vaccine Production Capability, 2000-present

Institute of Medicine, National Academy of Sciences
E. coli O157:H7 Risk Assessment Committee, 2001-2002

Institute of Medicine, Anti-Infectives Planning Committee to initiate a study on
bioterror agents and orphan vaccines, January 2002

NIAID Blue Ribbon Panel on Bioterrorism and its Implications for Biomedical
Research on Category B & C Agents, 2002

University Committees

University of Maryland Task Force on High Technology/Biotechnology,
1983Scientific Advisory Committee, Medical Biotechnology Center, 1993-5
Scientific Advisory Committee, Institute for Human Virology, 1997-

Medical School Committees

Student Research Day Committee 1982-84
Medical Biotechnology Task Force, 1984
Chairman, Subcommittee on Molecular Biology, 1984

Search Committee for a Chairperson for the Department of Microbiology, 1986 - 1987
Objectives Subcommittee, Institutional Self-Study Committee, 1998-1999
Research Subcommittee of SOM Strategic Plan 2000-2005
Steering Committee, 2000

Departmental Committees

Department of Medicine Research Committee, 1984 - 1988
Department of Medicine Promotions Committee, 1985 – 1992
Committee Chairman, 1985-1991

Primary Faculty Appointments

University of Maryland School of Medicine:
Department of Medicine:
Division of Infectious Diseases,
Assistant Professor July 1972 - June 1975
Associate Professor, July 1975 - June 1981
Research Professor, July 1981 - June 1982
Professor - July 1982
Head, Division of Geographic Medicine, January, 1984

Department of Pediatrics:
Instructor - July 1971-June 1972
Assistant Professor - July 1972-June 1982
Associate Professor - July 1982
Professor - July 1983
Acting Head, Division of Infectious Diseases - July 1984 - September 1985
Head, Division of Infectious Diseases and
Tropical Pediatrics - October, 1985 to present

Secondary and External Faculty Appointments

Department of Epidemiology and Preventive Medicine:
Professor

Department of Microbiology and Immunology:
Professor

Senior Associate, Department of Epidemiology,
Johns Hopkins University School of Hygiene and Public Health, 1985 to present

Visiting Professor
Facultad de Medicina,
Universidad Peruana Cayetano Heredia
Lima, Peru 1980 - present

Visiting Professor
Faculty of Tropical Medicine
Mahidol University
Bangkok, Thailand, 2001-

Other Appointments

Director, Center for Vaccine Development,
University of Maryland School of Medicine,
July 1974 - present

Acting Co-Director, Medical Biotechnology Center,

University of Maryland, 1987 - 1990

Editorial Boards

Editorial Board, **Journal of Infectious Diseases** 1986 - 1988
Editor, **Epidemiological Reviews**, 1985 - 1997
Board of Editors, **American Journal of Epidemiology**, 1997 - present
Editorial Board, 15th ed. of **Control of Communicable Diseases**, APHA, 1990
Editorial Board, 16th ed. of **Control of Communicable Diseases**, APHA, 1994
Editorial Board, **Infection and Immunity**, 1998 - 2000
International Editorial Board, **Public Health Reviews**, 1991 - present
Advisory Editor, **Molecular Medical Microbiology**, 1993
International Advisory Board, **GUT**, 1994 - 1998
International Advisory Board, **Annals of Tropical Medicine & Parasitology**, 1996
Editorial Board, **Vaccine**, 2000 - present

Military Service

U.S. Public Health Service Commissioned Corps, Asst.
Epidemic Surgeon Intelligence Service Officer,
Bacterial Diseases Branch, Epidemiology Program
Center for Disease Control, Atlanta, Georgia
Supervisors: Eugene J. Gangarosa, M.D., Phillip Brachman, M.D.

Active Duty Assignment - Medical Epidemiologist
assigned to the Shigella Vaccine Development Program,
Division of Infectious Diseases, University of
Maryland School of Medicine, Baltimore, Maryland
July 1970 - September 1973
Inactive Reserve - 1981 - 1997

**Special Lectures, Named
Visiting Professorships**

Howard Florey Memorial Lecturer and Visiting Professor, University of Adelaide,
South Australia, September, 1987.

Bazeley Oration, Australian Society for Microbiology, Sydney, 1992.

Felton Bequest Visiting Professor, Royal Children's Hospital,
Melbourne, Australia, October, 1994.

Lederle-Praxis Visiting Professor of Vaccinology, Oxford University, December,
1994

Bradford Dixon Memorial Lecture, The University of Alabama at Birmingham and
The Children's Hospital, Birmingham, Alabama, May, 2001.

Division Y (Public Health) Divisional Lecture, American Society for Microbiology
103rd General Meeting, Washington, D.C., May 21, 2003

Teaching Awards

The Colonel George W. Hunter III Award for Excellence as Senior Lecturer in
Tropical Medicine at the Walter Reed Army Institute of Research Tropical
Medicine Course, 1995.

Other Honors

Life Sciences Achievement Award of the University of Maryland at Baltimore
Presented October 17, 1995

Albert B. Sabin Gold Medal Award of the Albert B. Sabin Vaccine Institute for contributions in the field of vaccinology. Presented June 3, 1998

State of Maryland Governor's Citation "in recognition of contributions made in the medical profession". Presented November 9, 1999 at the Silver Anniversary celebration of the Center for Vaccine Development.

In conjunction with the Silver Anniversary celebration of the Center for Vaccine Development, Baltimore City Mayor Kurt L. Schmoke proclaimed November 9, 1999 as "Dr. Myron M. Levine Day" in recognition of contributions made in the field of vaccinology.

"Highly Cited Researcher in Immunology" awarded by Institute for Science Information (ISI)/Thomson Scientific as one of the top 100 most highly cited, influential researchers in the field of immunology. November 2000.

Voted by the editors of Baltimore Magazine as "Baltimorean of the Year." This honor was bestowed upon ten individuals in recognition of their contribution to improving the way of life in Baltimore in 2001. Featured in the January, 2002 issue.

Issued Patents

Kaper James B., Levine Myron M. US patent # 4,935,364 and # 5,135,862 "Method of isolating restriction fragment deletions in *Vibrio cholerae* and products thereof".

South African patent # 91/4286 (March 25, 1992).

EPO patent # 0119031 "Virulent *Vibrio cholerae* and methods for its production.

Baudry B, Levine MM. US patent # 5189151 (February 23, 1993). Highly specific DNA probe for enteroaggregative *Escherichia coli*.

Fasano A, Levine MM, Noriega F, Nataro JP. US patent #08/160317 Isolated DNA molecule encoding ShET2 of *Shigella flexneri* 2a.

Fasano A, Levine MM, Noriega F, Nataro JP. US patent #08/351147 Isolated DNA molecule encoding ShET1 of *Shigella flexneri* 2a.

Noriega F, Levine MM. US patent #08/629,600 Δ Gua mutants of *Shigella* spp. and vaccines containing the same.

Language Proficiency

	<u>Speak</u>	<u>Read</u>	<u>Write</u>
French	well	well	well
Spanish	well	well	well
Hebrew	poor	fair	poor

Recent Grant Support (partial listing)

R01 AI 40297 (Levine)	7/1/00-6/30/05
NIH	\$250,000 per year
Bacterial live vector-based vaccine against malaria.	

Generation of various constructs of attenuated *Salmonella typhi* carrying genes encoding putative protective antigens of *P. falciparum* genes to probe various components of the human immunological response to vaccination.

N01-AI-25461 (Levine) 6/1/02-5/31/07
NIH \$3,043,414 per year
Evaluation of control measures against infectious diseases other than AIDS.
Clinical testing of vaccines and related products in pediatric and geriatric populations.

T32 AI07524 (Levine) 7/1/02-6/30/07
NIH \$241,922 per year
Fellowship training program in vaccinology
T32 postdoctoral fellowship training grant

D43 TW 00907 (Levine) 9/20/97-1/31/04
NIH \$269,784 per year
International training and research in emerging infectious diseases
Training grant in Republic of Georgia and Chile.

R01-AI29471 (Levine) 4/1/98-3/31/04
NIH \$129,440 per year
Recombinant and live oral *Salmonella typhi* hybrid vaccines
Development of oral DPT vaccines.

Measles vaccine (Levine) 9/01/00-8/31/05
Bill and Melinda Gates Foundation \$4,095,000 per year
"Development of a "stealth" mucosal measles vaccine that can immunize young infants (2-6 months of age) in developing countries, despite the presence of maternal antibodies".

U54 AI57168 (Levine) 9/4/03 - 2/29/08
NIH \$3,365,168
Defense against biowarfare and emerging infection agents
Development and testing of vaccines, diagnostics, and therapeutics against agents of biowarfare.

U19 AI056578 (Nataro) 9/30/03 - 6/30/08
NIH \$645,385
Live bacterial vector vaccines against agents of bioterror
Development and pre-clinical testing of biodefense vaccines

FIELD EXPERIENCES (Partial Listing)

1. Safety testing of *Shigella flexneri* 2 and *Shigella sonnei* oral attenuated vaccines in institutionalized children, 1970.
2. Principal Investigator, U.S. Public Health Service *Shigella sonnei* Vaccine Field Trial, Fort Myers, Florida 1972-1973.
3. Principal Investigator, U.S. Public Health Service *Shigella flexneri* 2 Vaccine Field Trial, Staten Island, New York, 1971-1973.
4. Pan American Health Organization Consultant Epidemiologist to the Ministry of Health of the Dominican Republic to assist in the investigation and control of epidemic poliomyelitis. June-July 1971.
5. Conduction of a rectal swab and sero-survey to determine the prevalence of enteroviruses and enteroviral antibodies in the Republic of Haiti. July 1971.

6. Pan American Health Organization Consultant to Guatemala to discuss Epidemic Shiga Dysentery. August 1971.
7. World Health Organization Temporary Advisor to Morocco to evaluate diarrheal and enteric diseases. June 1972.
8. Site Inspector to report on the status of the U.S. PL 480-funded *Shigella* field trials of Dr. David Mel in Yugoslavia. July 1972.
9. Preliminary inspection of prospective field sites in South and Central America for the conduction of an oral typhoid vaccine field trial. April-June 1973.
10. Pan American Health Organization Consultant for the evaluation of endemicity of typhoid fever in Peru. August 1973.
11. World Health Organization Consultant Epidemiologist to the Smallpox Eradication Program during August, September and October 1975. Service as District Coordinator of Rajshahi District, Bangladesh during this period.
12. World Health Organization/Pan American Health Organization Advisor to Guatemala November 1975, to participate in a symposium and teaching seminar on enteric diseases, "Seminario sobre Nuevas Tendencias para el Diagnostico y Tratamiento del Sindrome Diarreico."
13. Director and Coordinator, "Swine Influenza Vaccine Testing Program," Maryland 1976.
14. Guest of the Ministry of Health, Cuba, to observe the Infant Diarrhea Control Program. September, 1977.
15. Pan American Health Organization Temporary Advisor on Diarrheal Diseases and Oral Fluid Therapy. Dominican Republic, Guatemala, Costa Rica, Panama, and Nicaragua, November, 1977.
16. Pan American Health Organization Advisor to Costa Rica, December 1977 to design, initiate and coordinate an investigation of the efficacy of glucose/electrolyte and rehydration therapy in infantile diarrhea due to rotavirus.
17. Pan American Health Organization Advisor to Costa Rica, July, 1978 to participate as Technical Consultant and Course Manager in Expanded Program on Immunization Course.
18. Pan American Health Organization Temporary Advisor to Surinam to discuss enteric diseases.
19. Pan American Health Organization consultant to Chile to study the epidemiology of endemic typhoid fever and design control measures.
20. Pan American Health Organization Temporary Advisor to Peru to assist as course manager in the Expanded Program on Immunization Course, January 1979.
21. Consultant to the World Health Organization Program on Diarrheal Diseases, Geneva, February 1979. Development of teaching aids and manuals to assist senior health officials to establish diarrhea disease control program.
22. Consultant to the Agency for International Development and the Academy for Educational Development project on use of mass media communication methods to combat diarrheal disease. Tanzania and Cameroon, April 1979.
23. Consultant to the Agency for International Development and the Academy for Educational Development project on use of mass media communication methods to combat diarrheal disease. Honduras and Ecuador, May 1979.
24. Temporary Advisor to Pan American Health Organization to assist in provincial level courses on treatment and control of diarrheal diseases, Amatlan and Huehuetenango, Guatemala, September 1979.
25. Consultant to the Academy for Educational Development project on use of mass media communication methods to combat diarrheal disease. Honduras, September 1979.

26. Temporary Advisor to Pan American Health Organization for the Regional Seminar on Diarrheal Disease Control. Lima Peru, October 1979.
27. U.S. Agency for International Development Consultant to the Government of Honduras to design a five year Diarrheal Disease Control Program, December 1979.
28. Pan American Health Organization consultant to Honduras to initiate oral therapy studies at Hospital Materno Infantil, February 1980.
29. Pan American Health Organization consultant to Peru to teach a course on diarrheal diseases, February 1980.
30. World Health Organization Consultant to Rwanda and Burundi, July 1980, to advise the ministries of health in organizing national diarrheal disease control programs for those countries with oral rehydration activities as the keystone.
31. Consultant to the Ministry of Health, Santiago, Chile on the control of endemic typhoid fever. Approximately two months annually since 1980 are spent supervising activities in Chile where the Center for Vaccine Development maintains a field unit in collaboration with the Ministry of Health.
32. U.S. Agency for International Development consultant to Bangladesh, December, 1982, to review the status of epidemiologic activities at the International Center for Diarrheal Disease Research, Bangladesh.
33. Supervised a large-scale controlled field trial of Ty21a oral typhoid vaccine involving 150,000 schoolchildren in Area Occidente, Santiago, Chile. Vaccination occurred in August and September, 1983. Surveillance for typhoid fever in the cohort was maintained for seven years.
34. Agency for International Development (PRITECH) consultant to Kenya to review the status of oral rehydration activities, 1984.
35. Consultant to the Egyptian Diarrheal Disease Control Project, July 1984.
36. Invited consultant to the Lanzhou Institute of Biological Products, Lanzhou, People's Republic of China, to discuss vaccines against enteric infections, November 1984.
37. U.S. Agency for International Development Consultant to the Vaccine Assistance Program, Delhi, India, to explore the possibility of field trials of new typhoid vaccines. May, 1986.
38. U.S. Agency for International Development Consultant to the International Center for Diarrheal Disease Research, Bangladesh, to evaluate the status of research at the Center. May, 1986.
39. U.S. Agency for International Development Consultant to Mahidol University Vaccine Trial Centre, Bangkok, Thailand, to explore the possibility of Phase 1 and 2 trials of malaria vaccine candidates. June, 1986.
40. Initiation of longitudinal field studies of the etiology and prevention of pediatric diarrhea in Santa Julia, Santiago, Chile in collaboration with the Ministry of Health and the Microbiology Unit of the University of Chile, November, 1986 - present.
41. Co-designed and participated in an AID-supported study of malaria in Yanomami Indians living along the Orinoco River in the Amazon region of Venezuela, 1987.
42. Initiation of collaborative studies of the etiology of persistent diarrhea in children with Dr. M.K. Bhan of the Department of Paediatrics, All-India Institute of Medical Sciences, New Delhi, India June 1987 - present.
43. Consultant to the Department of Preventive Medicine, Israel Defence Forces on the control of diarrheal diseases in soldiers, August, 1987 to present.

44. Initiation of Phase 2 studies of live oral cholera vaccine CVD 103-HgR in Thai university students and in Thai military personnel, Bangkok, Thailand, 1988.
45. Designed and provided overall coordination of Phase 2 pediatric studies of the safety and immunogenicity of CVD 103-HgR live oral cholera vaccine in Indonesian children, Jakarta, Indonesia, 1989-1992.
46. Consultant to the Institute of Epidemiology and Microbiology of the Chinese Academy of Preventive Medicine, Beijing China on enteric vaccine development, September, 1990.
47. Consultant to the Minister of Health, Chile on control of cholera, May, 1991.
48. Ad Hoc invited member, Chilean Cholera Commission, May, 1991.
49. Consultant to Centre Muraz, Bobo Doullasso, Burkina Faso, to explore possible collaborative studies on diarrheal diseases. 1991.
50. Consultant to the Sociedad Colombiana de Medicina Tropical y Parasitologia on the subject of cholera (inspection of two cholera affected areas of Colombia), October, 1991.
51. World Health Organization (Western Pacific Regional Office) Consultant in Vaccine Development to the People's Republic of China, November, 1991.
52. World Health Organization Consultant to the Program for Vaccine Development, 1992-1994.
53. Member of the U.S. Army Data Monitoring Safety Board for HIV Vaccine Field Trials, 1992 to present.
54. Consultant to the Ministry of Health and the Fundación Centro de Estudios Infectologicos, Argentina, February, 1993, to investigate epidemic cholera in Northern Argentina and to review activities of the the National Cholera Control Commission.
55. Evaluation of potential field sites in Mali to conduct phase 2 trial of CVD 103-HgR live oral cholera vaccine in HIV +/- adults. Mali, Africa. February, 1996.
56. Member of Vaccine Action Program and U. S. Malaria Mission. Mumbai and Rajasthan, India. February, 1997.
57. Member of a WHO field site team assessing the feasibility of using leishmanization to assess the efficacy of new *Leishmania* vaccines. Samarkand, Uzbekistan, September, 1997.
58. Participant "Consultative Meeting on Vaccine Development and Immunization Implementation", Harare, Zimbabwe, December 4, 1998.
59. Organizer, "Consultative Meeting on Vaccine Development and Immunization Implementation", Santiago, Chile, January 15 & 16, 1999.
60. Organizer, "Consultative Meeting on Vaccine Development and Immunization Implementation", New Delhi, India, February 9, 1999.
61. Member, initial GAVI mission to China, December, 2000.
62. Member of the CVD team that established, in conjunction with the Minstry of Health of Mali, a clinical bacteriology laboratory in the Gabriel Tour9 Hospital in Bamako, Mali, February, 2002 .
63. WHO consultant participating in the preparation of a field manual for the diagnosis, treatment and prevention of typhoid fever, Hanoi Vietnam, March, 2002.

64. WHO consultant to SEARO, Delhi, India for consultation on aerosol measles vaccine production and licensure track, September, 2002.
65. WHO consultant to SEARO, Delhi, and to the Serum Institute of India for consultation on aerosol measles vaccine production and licensure track, March, 2003.

**ABSTRACTS AND PRESENTATIONS AT NATIONAL
AND INTERNATIONAL MEETINGS (PARTIAL LISTING)**

1. Levine MM, DuPont HL, Hornick RB. Immunity in shigellosis. *Clinical Research*, XVIII:689, 1970 (abstract).
2. Levine MM, DuPont HL, Libonati JP, Gangarosa EJ, Snyder MJ, Hornick RB. An immunologic approach to the control of epidemic shiga dysentery. *Clinical Research* XIX:461, 1971 (abstract).
3. Levine MM, Gangarosa EJ. Oral attenuated streptomycin-dependent (SmD) shigella vaccines: *In vivo* stability and transmissibility. *Ped. Res.* 7:736, 1973 (abstract).
4. Levine MM, Hattwick M, Risi J. Poliovirus in the Caribbean. *Ped. Res.* 7:736, 1973 (abstract).
5. Levine MM and Hornick RB. Lactulose therapy in shigella carrier state and acute dysentery. 14th Interscience Conference on Antimicrobial Agents and Chemotherapy. San Francisco, Sept. 1974 (abstract).
6. Levine MM, Hornick RB, Snyder MH, DuPont HL, Woodward WE, Gilman RH. Streptomycin-dependent oral typhoid vaccine. Abstract of paper presented at 15th Interscience Conference on Antimicrobial Agents and Chemotherapy. September 26, 1975. Washington DC (abstract #371).
7. Levine MM, Gilman RH, Grados O, Solis R. Diagnostic value of Widal test in areas endemic for typhoid fever. Abstract of paper presented at 15th Interscience Conference on Antimicrobial Agents and Chemotherapy. Washington DC, September 24, 1975 (abstract #132).
8. Levine MM, Caplan ES, Cash RA, Snyder MJ. Diarrhea due to *Escherichia coli* that produce only heat-stable enterotoxin. Presented at the 16th Interscience Conference on Antimicrobial Agents and Chemotherapy. Chicago, Illinois, October 27-29, 1976.
9. Levine MM. Legal and ethical problems in epidemiologic research -- informed consent (abstract) *Am. J. Epidemiol.* 104:350, 1976.
10. Levine MM, Nalin DR, Hoover DL, Bergquist EHJ, and Hornick RB. Immunity to enterotoxigenic *Escherichia coli*. Presented at 17th Interscience Conference on Antimicrobial Agents and Chemotherapy, New York City, October 14, 1977.
11. Levine MM, Nalin DR, Craig JP, Hoover D, Bergquist EJ, Waterman D, Holley HP, Jr, Libonati JP, Hornick RB, Pierce NF. Immunity to Cholera. 13th Joint Conference on Cholera U.S.-Japan Cooperative Medical Science Program. Atlanta, September, 1977.
12. Levine MM. Immunity to Cholera in Man. Royal Society of Tropical Medicine and Hygiene Symposium on Cholera. London, England, May 4, 1978.
13. Levine MM. Immunity to Cholera as Evaluated in Volunteers. Nobel Symposium on Cholera. Sweden, August, 1978.
14. Levine MM. Oral Rehydration of Infant Diarrhea. Presented at Diarrhea Research Symposium at the Caribbean Epidemiology Center. October 18, 1978.
15. Levine MM, Daya V. Hemagglutination, Pili and Diarrheagenic Potential of *Escherichia coli* Strains in Man. 18th Interscience Conference on Antimicrobial Agents and Chemotherapy. Atlanta, October, 1978.
16. Levine MM. Infant Diarrhea in the Less-Developed World: Epidemiology and Control. Am Publ Hlth Assoc Annual Meeting, New York, Nov. 8, 1979.
17. Levine MM. Adhesion of Enterotoxigenic *Escherichia coli* in Humans and Animals. Presented at Ciba Foundation Symposium on Adhesion and Microorganism Pathogenicity. London, May, 1980.

18. Levine MM, Black RE, Clements ML, Nalin DR, Cisneros L, Finkelstein RA. Volunteer Studies in Development of Vaccines against Cholera and Enterotoxigenic *Escherichia coli*: A Review. Presented at Nobel Conference 3: Acute Enteric Infections in Children. New Prospects for Treatment and Prevention. Stockholm, Sweden, September 22-26, 1980.
19. Levine MM, Clements ML, Black RE, Hughes TP, Cleaves Tome F. Oral Rehydration with Simple Sugar/Salt Solutions as an Alternative in Rural Areas when Glucose/Electrolyte Solutions are Unavailable. Presented at Nobel Conference 3: Acute Enteric Infections in Children. New Prospects for Treatment and Prevention. Stockholm, Sweden, September 22-26, 1980.
20. Levine MM, Black RE, Clements ML, Young CR, Finkelstein RA, Honda T, Murphy JR. Clinical and Immunologic Response in Man Following Ingestion of Naturally-Occurring and Laboratory-Derived Attenuated *Vibrio cholerae*. Presented at the 16th Joint Conference U.S.-Japan Cooperative Medical Science Program Cholera Panel. Gifu, Japan, October 6-8, 1980.
21. Levine MM. Immunity to Enterotoxigenic *Escherichia coli* in Man Stimulated by Prior Infection or Purified Pili Vaccine. Presented at the Workshop on Bacterial Attachment. Stockholm, Sweden, January 23, 1981.
22. Levine MM. Shigella Infections and Vaccines: Experiences from Volunteer and Controlled Field Studies. International Conference on Shigellosis. Cox's Bazaar, Bangladesh, June 18, 1981.
23. Levine MM, Black RE, Clements ML, Young CR, Honda T, Finkelstein R. Texas Star-SR: Attenuated *Vibrio cholerae* Oral Vaccine Candidate. Presented at the 17th Joint Conference on Cholera, U.S.-Japan Cooperative Medical Science Program. Baltimore, October 26-28, 1981.
24. Levine MM, Black RE, Clements ML, Young CR, Lanata C, Sears S, Honda T, Finkelstein R. Texas Star-SR: Attenuated *Vibrio cholerae* oral vaccine candidate. Symposium on Enteric Infections in Man and Animals: Standardization of Immunological Procedures. Dublin, Sept. 6-8, 1982.
25. Levine MM, Black RE, Clements ML, Young CR, Boedeker EC, Cheney C, Brinton CC, Jr. Immunoprophylaxis of Enterotoxigenic *Escherichia coli* Infections in Man by Vaccines that Stimulate Anti-Pili Immunity. Symposium on Enteric Infections in Man and Animals: Standardization of Immunological Procedures. Dublin, Sept. 6-8, 1982.
26. Levine MM, Black RE, Clements ML, Kaper JB. Present Status of Cholera Vaccines. Biochemical Society, Cambridge, England, June 29 - July 1, 1983.
27. Levine MM, Kaper JB, Black RE, Clements ML, Morris JG. New Insights into the Pathogenesis of Cholera and its Prevention. 19th Joint Conference on Cholera. U.S.-Japan Cooperative Medical Science Program, Bethesda, Md. October 17-19, 1983.
28. Levine MM, Black RE, Clements M, Boedeker E, Young C, Rowe B. Stimulation of Intestinal Secretory IgA Antibody to Colonization Factor Fimbriae of Enterotoxigenic *Escherichia coli* by Both Killed Antigen and Live Oral Vaccines. Intestinal Immunity Workshop. XI. International Congress of Tropical Medicine and Malaria. Calgary, Alberta, September 16-22, 1984.
29. Levine MM. Landmarks on the Road Toward a Live Oral Attenuated Cholera Vaccine. Robert Koch Memorial Symposium on Cholera. Kashiwara City, Japan, November 5, 1984.
30. Levine MM. Epidemiologic Patterns of Endemic Typhoid Fever and Usefulness of Seroepidemiology. International Workshop on Typhoid Fever, Washington, DC November 29 and 30, 1984.
31. Levine MM. New Approaches to Immunization Against Cholera. Symposium on Cholera. Am. Soc. Trop. Med. and Hygiene, 33rd Annual Meeting. Baltimore, December 2-6, 1984.

32. Levine MM. Antibiotic Treatment for Infectious Diarrheas. NIH National Consensus Conference on Travelers' Diarrhea. Bethesda, January 24-26, 1985.
33. Levine MM. Dehydration, Metabolic and Nutritional Consequences of Infant Diarrhea and Oral Rehydration. International Seminar on Infectious Diarrhoea in the Young. Strategies for Control in Humans and Animals. Geelong, Australia, February 10-15, 1985.
34. Levine MM. Vaccines against Bacterial Enteric Infections of Man. Strategies for Control in Humans and Animals. Geelong, Australia, February 10-15, 1985.
35. Levine MM, Black RE, Ferreccio C, Clements ML, Lanata C, Rooney J, Germanier R, Chilean Typhoid Committee. The Efficacy of Attenuated *Salmonella typhi* oral vaccine strain Ty21a evaluated in controlled field trials. Development of Vaccines and Drugs against Diarrhea. 11th Nobel Conference, Stockholm, June 3-6, 1985.
36. Levine MM, Losonsky G, Herrington D, Kaper JB, Tacket CO, Rennels MB, Morris JG. Pediatric Diarrhea: The Challenge of Prevention. Thrasher International Conference on Pediatric Enteric Infections. Salt Lake City, June 13-15, 1985.
37. Levine MM, Morris JG, Losonsky G, Boedeker E, Rowe B. Fimbriae (Pili) Adhesins as Vaccines. Federation of European Microbiology Societies Symposium on Molecular Biology of Pathogenic Microorganisms. Lulea, Sweden, June 17-20, 1985.
38. Levine MM. Pathogenesis of Bacterial Enteric Infection. Keynote Speaker, Third International Workshop on Campylobacter Infections. Ottawa, July 8-10, 1985.
39. Levine MM. Stimulation of Mucosal Immunity against Enterotoxigenic *Escherichia coli*. Conference on Immunity and Infection at Mucosal Surfaces. Hamilton, Montant, August 26-28, 1985.
40. Levine MM. The Pathogenesis of Bacterial Diarrheas: A Basis for Rational Therapy. Canadian Society of Clinical Investigation. Vancouver, Canada, September 12, 1985.
41. Levine MM, Herrington D. The Current Status of Phase I and II Clinical Trials of the Anti-Sporozoite *Plasmodium falciparum* Vaccines. Agency for International Development Americas Conference on Malaria Vaccines. Ft. Lauderdale, October 9-12, 1985.
42. Levine MM. Status of Vaccines against Enteric Infections. Typhoid Vaccines. Interscience Conference on Antimicrobial Agents and Chemotherapy. Minneapolis, September 29 - October 2, 1985.
43. Levine MM, Kaper JB, Morris JG, Herrington D, Losonsky G, Tall B, Hall R. Reactogenicity, Colonizing Capacity and Immunogenicity of Further Attenuated, Genetically-Engineered *Vibrio cholerae* 01 Vaccine Strains. 21st U.S.-Japan Joint Conference on Cholera. Bethesda, October 21-23, 1985.
44. Levine MM. *Escherichia coli* qui Caused les Maladies Diarrheiques. Congres Africain de Maladies Infectieuses. Kigali, Rwanda, January 21-23, 1986.
45. Levine MM. Patogenia e Inmunidad de las Infecciones Intestinales. International Seminar on Diarrheal Diseases and Oral Rehydration. Mexico City, April 2-4, 1986.
46. Levine MM. New Vaccines under Development. Federation of Societies for Experimental Biology. St. Louis, April 13, 1986.
47. Levine MM. Immunity to Shigellosis. World Health Organization Meeting on Development of Vaccines against Shigellosis. Calcutta, May 19-22, 1986.

48. Levine MM. *Salmonella typhi* Vaccine. International Symposium on Vaccine Development and Utilization. Sponsored by the U.S. Agency for International Development and the Pan American Health Organization. Washington, D.C., June 9 and 10, 1986.
49. Levine MM. Vaccines against Bacterial Enteric Infections. International Congress of Pediatrics, Honolulu, July 9, 1986.
50. Levine MM. New Approaches to Antibacterial Vaccines. Vaccines against Enteric Infections. IXth International Congress of Infections and Parasitic Diseases. Munich, July 20-26, 1986.
51. Levine MM. Keynote Speaker, 24th Annual Meeting of the Infectious Diseases Society of America. *Escherichia coli* that cause Diarrhea. New Orleans, October 3, 1986.
52. Levine MM. Clinical and field trials to assess the efficacy of vaccines against bacterial enteric infections. Sclavo International Symposium. November 17-19, 1986.
53. Levine MM, Jian-Guo J, Kaper JB, Lior H, Prado V, Tall B, Nataro J, Karch H, Wachsmuth K. International Symposium and Workshop on Verocytotoxin-Producing Infections. A DNA Probe to Identify Enterohemorrhagic *Escherichia coli* of O157:H7 and other Serotypes that Cause Hemorrhagic Colitis and Hemolytic Uremic Syndrome. Toronto, July 12-15, 1987.
54. Levine MM. Vaccines against typhoid fever. The Annual Howard Florey Memorial Lecture, University of Adelaide, September, 1987.
55. Levine MM. Prospects for a Vaccine against AIDS. Annual meeting of the Chilean Infectious Diseases Society, October, 1987.
56. Levine MM. Identification of diarrheagenic *Escherichia coli* by DNA probes. Fifth International Symposium on Rapid methods and Automation in Microbiology and Immunology. Florence, Italy, November 6, 1987.
57. Levine MM. Diarrheal diseases in young children in the developing world: magnitude of the problem and prospects for prevention by vaccines and other interventions. Sackler Visiting Scholar Lecture, Sackler Institute of Advanced Studies, Tel Aviv University Medical School, November 8, 1987.
58. Levine MM. Update on vaccines against bacterial infections in pediatrics. International Congress of Pediatrics, Bangkok, Thailand, November 11, 1987.
59. Levine MM. Progress in vaccines against typhoid fever. International Conference on Advanced Knowledge on Vaccines for Tropical Diseases of Public Health Importance. Bangkok, Thailand, February 1, 1988.
60. Levine MM. New developments in vaccines against typhoid fever. Tel Hashomer Hospital, Tel Aviv, Israel, November 26, 1987.
61. Levine MM. The pathogenesis and epidemiology of *Escherichia coli* that cause diarrhea. Colloquium Lecture, Tel Aviv University School of Medicine, December 9, 1987.
62. Levine MM. New developments in vaccines against cholera. International Conference on Advanced Knowledge on Vaccines for Tropical Diseases of Public Health Importance. Bangkok, Thailand, February 2, 1988.
63. Levine MM. Progress in vaccines against typhoid fever. International Conference on Advanced Knowledge on Vaccines for Tropical Diseases of Public Health Importance. Bangkok, Thailand, February 2, 1988.
64. Levine MM. The application of biotechnology to vaccine development. Keynote talk at the Annual Meeting of the Israeli Society of Microbiology, Tel Aviv, Israel, February 8, 1988.

65. Levine MM. The role of clinical trials in vaccine development. Joint Israel Defence Forces - United States Army Conference on Vaccines of Military Importance. Kfar Maccabiah, Ramat Gan, Israel, March 21-23, 1988.
66. Levine MM. New diagnostic tools in gastrointestinal microbiology. International Meeting on Recent Progress in Pediatric Gastroenterology and Nutrition. Naples, June 2-3, 1988.
67. Levine MM. Pathogenesis of diarrhoeal diseases caused by *Escherichia coli*. International Symposium on Infections in Developing Countries. Johannesburg, South Africa, August 31, 1988.
68. Levine MM. New developments in malaria vaccines. International Symposium on Infections in Developing Countries. Johannesburg, South Africa, September 1, 1988.
69. Levine MM. *Escherichia coli* que causan la diarrhea: patogenia y propiedades de virulencia. Keynote speaker, Annual meeting of the Argentinian Society of Microbiology, Mar de Plata, Argentina, November 21-22, 1988.
70. Levine MM. Prospects for oral enteric vaccines. XIII International Symposium on Intestinal Microecology. Sardinia, Italy, September 11-14, 1988.
71. Levine MM. Oral vaccines against typhoid fever: results of recent controlled field trials. Symposium on oral vaccines, American Society for Microbiology Annual Meeting, Miami Beach, May 9, 1988.
72. Levine MM. The pathogenic mechanisms in *Escherichia coli* diarrhea. Dallas Infectious Diseases Dinner Seminar, Dallas, Texas, January, 1989.
73. Levine MM. Typhoid vaccines. Armed Forces Epidemiological Board, Washington, D.C., February 16, 1989.
74. Levine MM. Enterotoxigenic *Escherichia coli*. A new diarrheal agent. Federation of European Microbiological Societies Workshop on Microbial Surface Components and Toxins in Relation to Pathogenesis. Ramat Rachel, Israel, May 15-19, 1989.
75. Levine MM. The epidemiology of diarrhea due to *Escherichia coli* in children less than five years of age. Second Annual Joint Israel Defence Force - U.S. Army Medical Research and Development Command Conference on Vaccines. Tel Hashomer Hospital, Tel Aviv, May 30-31, 1989.
76. Levine MM. Attenuated *Salmonella typhi* live oral vaccine strains expressing foreign antigens: a summary of clinical experience. World Health Organization Meeting on the Potential Use of Live Vectors for Vaccines: the Biological Requirements and the Medical Constraints. Geneva, Switzerland June 19-22, 1989.
77. Levine MM. Shigellosis. 26th Annual Semana Pediatrica, Hospital Nacional de Ninos. San Jose, Costa Rica, September 18-22, 1989.
78. Levine MM. Attenuated *Salmonella* as carrier vaccine strains for the expression of foreign antigens. U.S. - India Joint Vaccine Working Group Meeting. New Delhi, India, October 23-26, 1989.
79. Levine MM. Progress in the development of live oral vaccines to prevent cholera. International Center for Diarrhoeal Diseases Research, Bangladesh. Dhaka, Bangladesh, October 28, 1989.
80. Levine MM. *Salmonella* vectors for immunization. Seminar given at the Walter and Eliza Hall Institute for Immunology, Melbourne, Australia, November 8, 1989.
81. Levine MM. The Center for Vaccine Development. Invited lecture given at the Commonwealth Serum Laboratories, Melbourne, Australia, November 10, 1989.
82. Levine MM. Vaccines against enteric infections. Annual Meeting of the Australian Society for Infectious Diseases, Melbourne, Australia, November 13, 1989.

83. Levine MM. The pathogenesis of bacterial enteric infections. 2nd Annual Course in Infectious, Parasitic and Tropical Diseases, Armed Forces Institute of Pathology. Bethesda, Maryland November 30, 1989.
84. Levine MM. Field trials of efficacy of live oral typhoid vaccine, Ty21a. American Epidemiological Society, Baltimore, March 1990.
85. Levine MM. Prevention of enteric infections using vaccines and oral immunoglobulin preparations. International Symposium on the Management of Acute Diarrhea. Stuart, Florida, May 17-19, 1990.
86. Levine MM. The design of clinical trials. First European Course on Hospitalogy. Annecy, France, June 1, 1990.
87. Levine MM. Clinical and field trials with attenuated *Salmonella typhi* as live oral vaccines and as "carrier" vaccines. International Symposium on Oral Immunization using Recombinant Bacteria. Munich, June 4-8, 1990.
88. Levine MM. A large-scale field trial comparing the efficacy of Ty21a, live oral typhoid vaccine in liquid versus enteric-coated capsule formulations. Annual Joint Meeting on Vaccines of the U.S. Army Medical Research and Development Command and the Israel Defence Force. Gaithersburg, Maryland June 18-20, 1990.
89. Levine MM. *Salmonella* vaccines. International symposium on New Antimicrobial Strategies, Brocket Hall, England, July 1-3, 1990.
90. Levine MM. Vaccines against typhoid fever. Department of Chemical Immunology Seminar, the Weizmann Institute of Science, Rehovoth, Israel, July 13, 1990.
91. Levine MM. Attenuated *Salmonella typhi* as a live oral vaccine and as a carrier to express foreign antigens. Life Science Transfer Technology Seminar, Kyoto, September 19, 1990.
92. Levine MM. *Escherichia coli* that cause diarrhea in the tropics. International Union of Microbiological Societies, Osaka, Japan, September, 19, 1990.
93. Levine MM, Fasano A, Savarino S, Robertson D, Maneval D. Enterotoxins elaborated by enteroinvasive and enteroaggregative *Escherichia coli*. 26th Joint Conference of the U.S.- Japan Cooperative Medical Science Program on Cholera and Related Diarrheal Diseases. Kyoto, September 24-26, 1990.
94. Levine MM. Typhoid vaccines. Council on Industrial Health. Johns Hopkins University, Baltimore, MD, October 3, 1990.
95. Levine MM. The new generation of typhoid vaccines: prospects for the protection of international travelers and children in endemic areas. Centers for Infectious Diseases Grand Rounds. Centers for Diseases Control, Atlanta, Georgia, October 10, 1990.
96. Levine MM. Vaccines against diarrheal infections. Symposium on diarrheal diseases at the Annual Meeting of the American Society of Tropical Medicine and Hygiene. New Orleans, November 6, 1990.
97. Levine MM. *Salmonella typhi* and foreign epitopes. Philippe Laudat International Conference on Immune Responses to Proteins with Recombinant Epitopes: Perspectives for Vaccines. Bischoffsheim, France, November 12-15, 1990.
98. Levine MM. Advances en el desarrollo de vacunas contra la fiebre tifoidea. 5th Congreso Panamericano de Infectologia, Lima, Peru, April 7-10, 1991.
99. Levine MM. Cholera: epidemiologia y control de la enfermedad. 5th Congreso Panamericano de Infectologia, Lima, Peru, April 7-10, 1991.

100. Microbiologia, inmunologia y patogenia del colera. Congreso Paraguayo de Pediatría, October 11, 1991, Asuncion, Paraguay.
101. Fisiologia de la rehidratacion oral. Congreso Paraguayo de Pediatría, October 11, 1991, Asuncion, Paraguay.
102. Vacunas del futuro. Sociedad Colombiana de Medicina Tropical y Parasitologia, Bogota, Colombia, October 13, 19, 1991.
103. La epidemiologia global del colera. Sociedad Colombiana de Medicina Tropical y Parasitologia, Bogota, Colombia, October 13, 1991.
104. *Escherichia coli* that cause diarrhea. Annual Meeting of the Brazilian Pediatric Society, Porto Alegre, Brazil, October 17, 1991.
105. Vaccines against *Haemophilus influenzae* type b. Annual Meeting of the Brazilian Pediatric Society, Porto Alegre, Brazil, October 17, 1991.
106. New vaccines against typhoid fever and cholera. Congreso Latinoamericano de Infectologia Pediatrica, Santiago, Chile October 23, 1991.
107. Perspectives on diarrhea caused by *Escherichia coli*. Congreso Latinoamericano de Infectologia Pediatrica, Santiago, Chile October 23, 1991.
108. Cholera - Worldwide epidemiology and prevention. Annual Meeting of the Israel Society for Microbiology, Beer Sheva, Israel February 11, 1992.
109. Current trends in *S. typhi* vaccines. Society for General Microbiology, 122nd Meeting, University of Wales College of Cardiff March 23-26, 1992.
110. Cholera. Biomedical Research Advancement: Saturday Scholars (BRASS) Program, National Institutes of Health, April 4, 1992.
111. A progress report on the safety, immunogenicity and efficacy of CVD 103-HgR, a one dose, genetically engineered live oral cholera vaccine. First International Symposium on Cholera in the Americas, Mexico City, April 20-21, 1992.
112. The problem of cholera in the world. International Symposium on Cholera in Latin America, Buenos Aires, Argentina, April 29, 1992.
113. Vaccine development. International Symposium on Cholera in Latin America, Buenos Aires, Argentina, April 29, 1992.
114. Cholera: Keynote address for the Cholera session. Vaccines for Enteric Diseases, Cambridge, England, April 13-15, 1992.
115. Attenuated *Salmonella typhi* as live oral vaccines to prevent typhoid fever and as carrier vaccines to express foreign antigens. NATO Advanced Research Workshop on the Biology of *Salmonella*, Portofino, Italy, May 10-15, 1992.
116. Production, laboratory evaluation, and clinical trial of vaccines against cholera. International Symposium on Cholera in the American Continents, Sao Paulo, Brazil, May 21-23, 1992.
117. Old and new cholera vaccines: A 100 year perspective. The American Society for Microbiology 1992 General Meeting, New Orleans, Louisiana, May 27, 1992.
118. A new generation of cholera vaccines. The Bazeley Oration, The Australian Society for Microbiology 1992 Annual Meeting, Sydney, Australia, July 16, 1992.

119. Cholera. Brazilian Society of Immunology Annual Meeting, August 26, 1992.
120. Enteric Fever: *Salmonella typhi*. Eastern Pennsylvania Branch, American Society for Microbiology, Philadelphia, PA, November 12, 1992.
121. Attenuated *Salmonella typhi* live vector vaccines expressing foreign antigens: Versatility to meet public health demands. University of California at San Francisco. February 9, 1993.
122. Attenuated *Salmonella typhi* live vector vaccines expressing foreign antigens. The Mount Sinai Medical Center, New York, February 23, 1993.
123. The recent cholera epidemic in Latin America. Baltimore Tropical Medicine Dinner Club. Baltimore, Maryland. March 17, 1993.
124. Vaccines to prevent enteric infections in travelers. Presented at the 3rd Conference on International Travel Medicine, Paris, France, April 26, 1993.
125. CVD 103-HgR, live oral cholera vaccine. Presented at the International Workshop on New Approaches to Bacterial Vaccines. Munich, Germany, April 28-29, 1993.
125. Vacuna oral contra el colera. Congreso de la Sociedad Panameiricana de Infectologia, Viña del Mar, Chile, May 27, 1993.
126. Vacunas contra enfermedades entericas. Congreso de la Sociedad Panameiricana de Infectologia, Viña del Mar, Chile, May 27, 1993.
127. Vaccines against cholera and enterotoxigenic *E. coli*. The 18th International Congress of Chemotherapy. Stockholm, Sweden. June 27-July 2, 1993.
128. Modern approaches to the development of vaccines against bacterial enteric infections. Canadian Society of Microbiology/Society for Industrial Microbiology Annual Meeting. Symposium on Vaccination Strategies for Bacterial Pathogens, keynote address. Toronto, Ontario, August 3, 1993.
129. *Shigella*, *Salmonella* and other enteric vaccines. Ross Conference on Strategies for Pediatric Vaccines: conventional and molecular approaches. San Diego, CA, September 19-22, 1993.
130. The emergence of diarrheal diseases including cholera. Colloquium on Changes in Human Ecology and Behavior: Infectious Diseases. National Academy of Sciences, Washington, D.C., September 27-28, 1993.
131. Cholera Vaccines and Typhoid Vaccines. Invited talks given at the Mexican Infectious Diseases Society XVIII Annual Meeting, Mexico City, November 21-24, 1993.
132. Recent Advances in Vaccine Development. Invited talk delivered at the XI Biennial Conference of the Pakistan Pediatric Association, Lahore, Pakistan, February 2-5, 1994.
133. Experiences with *Haemophilus influenzae* type b capsular polysaccharide-tetanus protein conjugate vaccine in Chilean infants. Special lecture of the Korean pediatric Society, Seoul, Korea, March 30, 1994.
134. Bacterial enteric vaccines. Mucosal Immunology Symposium, FASEB, Anaheim, CA, April 28, 1994.
135. Cholera Vaccines. Invited lecture presented at the 2nd Simposio Internacional de Infectologia Pediatrica, Cordoba, Argentina, May 9, 1994.

136. Mucosal immunization -- The perspective of the vaccinologist versus the immunologist. Invited talk at the inaugural meeting of the International Society for Vaccines. Las Vegas, May 22-23, 1994.
137. Live oral cholera vaccines - A status report. 7th Asian Conference on Diarrheal Diseases. Dhaka, Bangladesh, September 17, 1994.
138. Attenuated strains of *Vibrio cholerae*, *Salmonella typhi* and *Shigella* as live oral vaccines and as live vectors. Keystone Conference on Mucosal Immunization. January, 1995.
139. The epidemiology of typhoid fever. WHO meeting on Vaccines against Bacterial Infections, Madrid, March 1-2, 1995.
140. Large-scale post-licensure effectiveness trial of PRP-T conjugate vaccine in preventing invasive *Haemophilus influenzae* type b infections in Chilean infants. Annual Meeting of the American Epidemiological Society, Tampa, Florida March 23, 1995.
141. Attenuated *Salmonella* as live oral vaccines against typhoid fever and as live vectors. New Approaches to Vaccine Development, Vienna April 12, 1995.
142. Enteric vaccines -- the next five years. Keynote talk at the 8th International Workshop on *Campylobacters*, *Helicobacters* and Related Organisms. Winchester, United Kingdom, July 12, 1995.
143. Characteristics of newly licensed typhoid vaccines (Ty21a, Vi polysaccharide), candidate Vi conjugate vaccines and new generation attenuated vaccine strains. U.S.-India Vaccine Program, New Delhi, July 17, 1995.
144. Immunizations for diarrheal diseases. International Congress of Chemotherapy, Montreal, July 20, 1996.
145. The epidemiology of enteropathogenic *Escherichia coli* (EPEC) infections in Chile. International Symposium on EPEC, Sao Paulo, Brazil, August 28, 1995.
146. Prospects for a vaccine against EPEC. International Symposium on EPEC, Sao Paulo, Brazil, August 28, 1995.
147. Engineered live oral cholera vaccines. State of the Art Minilecture, 35th Interscience Conference on Antimicrobial Agents and Chemotherapy, San Francisco, September 18, 1995
148. Development of a live oral cholera vaccine; a paradigm. NIH Meeting on Planning and Implementing Clinical Trials for Parasitic Diseases, Bethesda, MD, September 19, 1995.
149. Live attenuated vaccines against bacterial enteric infections. Year of Louis Pasteur Symposium, Paris, September 26, 1995.
150. Vaccines against diarrheal disease, dysentery and enteric fever. Presented at Nestlé Nutrition Workshop Series 38 :Diarrheal Disease@. Islamabad, Pakistan, October 23, 1995.
151. New developments in cholera vaccines. Congress of the African Society of Microbiology. Bamako, Africa. February 2, 1996.
152. A consideration of the host factors that modulate susceptibility to cholera and the immune response to engineered live oral cholera vaccines. ICTDR Meeting, Bethesda, MD, April 23, 1996.
152. Mucosal routes of vaccination. Edward Jenner Bi-centennial Celebration, Royal College of Physicians, London. May 15, 1996.
153. Attenuated *Salmonella typhi* and *Shigella flexneri* as live vector vaccines: Expression of foreign antigens and elicitation of relevant immune responses. Munich, Germany. May 28, 1996.

154. New vaccines against cholera and typhoid fever. International Society for Infectious Diseases, Hong Kong, June 12, 1996.
155. Engineered vibrio cholerae and shigella strains as live oral vaccines and as live vectors to deliver foreign antigens by mucosal immunization. 10th International Biotechnology Symposium. Sydney, Australia. August 26, 1996.
156. The vaccine development paradigm: Illustrative examples in the development of vaccines against tropical diseases. American Society of Tropical Medicine and Hygiene, Baltimore, MD, December 2, 1996.
157. Development of enteric vaccines. Asia Pan Pacific Society for Paediatric Gastroenterology and Nutrition, Jakarta, Indonesia, December 16, 1996.
158. Quantitating invasive Hib disease in Santiago, Chile. Revelation of an important public health problem. First International Symposium on Hib in Asia, Bali, Indonesia, December 17, 1996.
159. Cholera vaccine for travelers: Indications and options. Presented at the Fifth International Conference on Travel Medicine, Geneva, SW, March 24, 1997.
160. Bacterial live vector vaccines. Presented at 2nd National Symposium on Basic Aspects of Vaccines, Walter Reed Army Institute of Research, Bethesda, MD, April 30, 1997.
161. Salmonella vaccines as carriers of foreign antigens. American Gastroenterological Association. Washington, DC. May 13, 1997.
162. The molecular epidemiology of 19th century cholera: What was the serogroup and biotype of Vibrio cholerae responsible for the early cholera pandemics? First International Symposium The Archaeology of Emerging Diseases, Tel Aviv, Israel, May 20, 1997.
163. Artificial challenge studies. Presented at International Association of Biologic Standardization Meeting on Clinical Trials in Paris, France, May 28, 1997.
164. Phase 1 and 2 clinical trials of candidate malaria vaccines. Presented at the Second Global Meeting on Parasitic Diseases with a focus on Malaria, Hyderabad, India. August 18, 1997.
165. New strategies of bacterial vaccines against enteric infections. Presented at the Deutschen Gesellschaft für Hygiene und Mikrobiologie in Jena Germany. October 7, 1997.
166. Developments in prevention: The way forward. Presented at the Strategies for Vaccine Protection in Developing Countries, Universidad Nacional Autonoma de Mexico, Mexico City. October 17, 1997.
167. Emerging infections: fundamental concepts and models to explain a phenomenon of global importance. Presented at the Congreso Chileno de Infectología, Valdivia, Chile, December 2, 1997.
168. Mucosal vaccines. Presented at the Congreso Chileno de Infectología, Valdivia, Chile, December 3, 1997.
169. Recent research on vaccines and prevention of typhoid fever. Presented at the Third Asia-Pacific Symposium on typhoid fever and other salmonellosis, Denpasar, Bali, Indonesia December 8-10, 1997.
170. New typhoid vaccine development. Presented at Workshop on Typhoid Fever, National Institute of Health, Seoul, Korea, December 16, 1997.
171. *Salmonella* as a live vector. Presented at the WHO/NIAID Workshop on Vaccines administered via Mucosal Surfaces, February 9-11, 1998.

172. Vaccines delivered via mucosal surface. Presented at the International Workshop on Vaccine Development, Rio de Janeiro, April 14-16, 1998.
173. Mucosal Immunization. Presented at the 8th International Congress on Infectious Diseases meeting, Boston, May 15-18, 1998
174. Prospects for improving disease control through simplifying vaccination: Oral/mucosal vaccines and combinations. Presented at the Consultative Group Meeting of the Children's Vaccine Initiative in Geneva, Switzerland, November 9-10, 1998.
175. Live oral vaccines against enteric pathogens. Presented at the Centennial celebration of the Swiss Serum and Vaccine Institute, Berne, Switzerland, November 6, 1998.
176. Rotavirus Vaccines. Presented at the Infectious Diseases in Children conference, New York, November 21-22, 1998.
177. Status of typhoid vaccines. Presented at the V International Congress of Tropical Pediatrics, Jaipur, India, February 10-15, 1999.
178. Oral and Nasal Immunization. Presented at A New Approaches to Bacterial Vaccine Development, Munich, Germany, May 19-22, 1999.
179. Update on Edible Vaccines. Presented at meeting on An Overview on Vaccine Research in WHO and UNAIDS@, Montreux, Switzerland, June 16-18, 1999.
180. Vacunas contra Enfermedades Entericas. Presented at the 8th Congreso de la Sociedad Latinoamericana de Infectología Pediátrica. Asunción, Paraguay, August 8-11, 1999.
181. Enfermedades Emergentes. Presented at the 8th Congreso de la Sociedad Latinoamericana de Infectología Pediátrica. Asunción, Paraguay, August 8-11, 1999.
182. Development of new vaccines against diarrheal pathogens -- a hope for developing countries? Presented at the International Congress on Cooperative Research with Developing Countries. Basel, Switzerland, August 19-21, 1999.
183. How to test vaccines in the field -- Are there alternatives? Presented at the International Congress on Cooperative Research with Developing Countries. Basel, Switzerland, August 19-21, 1999.
184. Organizing Vaccine Trials. Presented at the 1st Global Conference on Vaccines and Immunisation into the next millennium. Manchester, UK, September 6-9, 1999.
185. Evaluaciones de la eficacia y la efectividad (impacto epidemiológico) de las vacunas. Second Congress of the Sociedad Española de Medicina Tropical y Salud Internacional. Sitges (Barcelona), January 27-29, 2000.
186. Current status of new generation vaccines: Live oral; Live oral Shigella vaccines; and Live oral Cholera vaccines (CVD candidates). Three talks presented at the DOMI Program Meeting, WHO headquarters, Geneva, Switzerland. February 7-8, 2000.
187. Live oral vaccines to prevent enteric infections in travelers. Presented at the Oral Vaccination Symposium at I. Matzkel "Droeth" Ltd., Tel Aviv, Israel. March 23, 2000.
188. Live attenuated vectors: have they delivered? Presented at the Millennium Joint Meeting of the Society for General Bacteriology and the Society for Applied Microbiology, April 10-14, 2000.
189. Global efforts in vaccination. From the laboratory to the field. Presented at the Wellcome Trust conference on Bacteriology in the Tropics. Cambridgeshire, UK, May 14-17, 2000.

190. The global burden of diarrheal diseases: A perspective. Presented at the XV International Congress for Tropical medicine and Malaria. Cartagena, Bogota, Colombia, August 20-25, 2000.
191. Progress in non-parenteral delivery of vaccines. Infectious Disease Society of America. New Orleans, LA, September 7-10, 2000.
192. Ethical Considerations in Mass Vaccination Campaigns. Presented at the Berzelius Symposium, Vaccines are beneficial! What are the risks? Stockholm, February 8-10, 2001.
193. Vaccines against enteric infections: Public health rationale, vaccinology strategies, successes, disappointments and surprises. Presented at the Institute Butantan Symposium on vaccines against enteric infections. Sao Paulo, Brazil, February 19-22, 2001.
194. Realizing the promise of new vaccine technologies: Pitfalls, perseverance, disappointments and successes. Presented at the World Vaccine Congress. Montreal, Canada, April 3-5, 2001.
195. Vaccine triumphs and tribulations in the USA and globally. Presented at the Practical Day of Pediatrics, University of Alabama-Birmingham, May 16-17, 2001.
196. "Oral Vaccines", and, "Attenuated *Salmonella typhi* and *Shigella* as live vectors to deliver foreign protein antigens or DNA vaccines to the mammalian immune system". Both lectures presented at the American Society for Microbiology. Orlando, Florida, May 20-24, 2001.
197. Review of issues too be considered in Phase 3 trials: Lessons from various clinical trials. Presented at the Second Advanced Vaccinology Course. Merieux Foundation, Annecy, France, May 23, 2001.
198. Issues in clinical trials. Presented at the Global Vaccine Research Forum. Montreux, Switzerland, June 10-12, 2001.
199. Cholera Vaccines – Overview. Presented at the Vaccines for Enteric Diseases VED 2001. Tampere, Finland, September 12-14, 2001.
200. Widespread Vaccination Against Gastrointestinal Pathogens in DCC - Is it Worthwhile? Pediatric Infectious Disease Conference. Monterey, California, October 28-30, 2001.
201. Vaccines against bioterror agents: Overcoming the challenges to development, testing, stockpiling and implementation. Presented at the University of Maryland, Baltimore, Health Policy Seminar, November 16, 2001.
202. Overview of the Research and Development Activities of the Global Alliance for Vaccines and Immunization. Presented at the NFID's Fifth Annual Conference on Vaccine Research. Baltimore, Maryland, May 6-8, 2002.
202. Memory at the Mucosal Level. Presented at the NIFID's Fifth Annual Conference on Vaccine Research. Baltimore, Maryland, May 6-8, 2002.
203. Attenuated *Shigella* and *Salmonella Typhi* Live Vectors to Deliver DNA Vaccines via Mucosal Administration. Presented at the 4th International Meeting, New Approaches to Bacterial Vaccine Development. Munich, Germany, May 26-29, 2002.
204. Typhoid Fever: Lessons from the Past and Challenges for the Future. Typhoid Symposium. American Society of Tropical Medicine and Hygiene, Annual Meeting, November 12, 2002, Denver.
205. The Future: Typhoid and Cholera Vaccines. Presentation at the Centennial Celebration of the Pan American Health Organization, November 25, 2002, Washington, D.C.

206. Typhoid. Presentation at the International Vaccine Institute's Inaugural Symposium, New Frontiers in Vaccinology Research, June 26, 2003, Seoul, Korea.

JOURNAL ARTICLES

1. Clyde DF, Miller RM, Schwartz AR, Levine MM. The treatment of falciparum malaria with sulfalene and trimethoprim. *Am J Trop Med Hyg* 20:804-811, 1971.
2. Levine MM, DuPont HL, Gangarosa EJ, Hornick RB, Snyder MJ, Libonati JP, Glaser K, Formal SB. Shigellosis in custodial institutions. II. Clinical, immunologic, and bacteriologic response of institutionalized children to oral attenuated *Shigella* vaccines. *Am J Epidemiol* 96:40-49, 1972.
3. Levine MM, DuPont HL, Formal SB, Hornick RB, Takeuchi A, Gangarosa EJ, Snyder MJ, Libonati JP. Pathogenesis of *Shigella dysenteriae*-1 (Shiga) dysentery. *J Infect Dis* 127:261-270, 1973.
4. Levine MM, DuPont HL, Khodabandelou M, Hornick RB. Long-term *Shigella*-carrier state. *New Eng J Med* 288:1169-1171, 1973.
5. Wald ER, Levine MM, Togo Y. Concomitant Varicella and staphylococcal Scalded Skin Syndrome. *J Pediatr* 83:1017-1019, 1973.
6. Levine MM, Rice PA, Gangarosa EJ, Morris GK, Snyder MJ, Formal SB, Wells JG, Gemski P, Jr., Hammond J. An outbreak of Sonnei shigellosis in a population receiving oral attenuated *Shigella* vaccines. *Am J Epidemiol* 99:30-36, 1974.
7. Levine MM, Gangarosa EJ, Werner M, Morris GK. Shigellosis in custodial institutions. III. Prospective clinical and bacteriologic surveillance of children vaccinated with oral attenuated *Shigella* vaccine. *J Pediatr* 84:803-806, 1974.
8. Levine MM, Togo Y, Wald ER. Practicability of influenza surveillance by virus culture of children. *Am J Epidemiol* 100:272-276, 1974.
9. Levine MM, Edsall G, Bruce-Chwatt LJ. Live virus vaccines in pregnancy: risks and recommendations. *Lancet* II:34-38, 1974.
10. Levine MM, Gangarosa EJ, Barrow WB, Norris GK, Wells JG, Weiss CF. Shigellosis in custodial institutions. IV. *In Vivo* stability and transmissibility of oral attenuated streptomycin-dependent *Shigella* vaccines. *J Infect Dis* 131:704-707, 1975.
11. Levine MM, Hornick RB, DuPont HL. Lactulose in the therapy of acute *Shigella* dysentery and *Shigella*-carrier state. *Antimicrob Agents Chemother* 8:581-584, 1975.
12. Gilman RH, Termini M, Levine MM, Mendosa PH, Calderone E, Vasquez V, Martinez E, Snyder MJ, Hornick RB. Comparison of trimethoprim-sulfamethoxazole and amoxicillin in chloramphenicol-resistant and sensitive typhoid fever. *J Infect Dis* 132:630-635, 1975.
13. Gilman RH, Termini M, Levine MM, Mendoza PH, Hornick RB. Relative efficacy of blood, urine, rectal swab, bone marrow, and rose-spot cultures for recovery of *Salmonella typhi* in typhoid fever. *Lancet* I:1211-1215, 1975.
14. Levine MM. Use of live virus vaccines in pregnant women in the tropics. *Tropical Doctor* 5:83-85, 1975.
15. Levine MM, Ashman R, Heald FP. Anaerobic (putrid) lung abscess in adolescence. *Am J Dis Child* 130:77-81, 1976.
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CHAPTERS AND BOOKS

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